
**UNITED STATES MARINE CORPS
THE BASIC SCHOOL
MARINE CORPS TRAINING COMMAND
CAMP BARRETT, VIRGINIA 22134-5019**

**CHEMICAL, BIOLOGICAL,
RADIOLOGICAL AND
NUCLEAR DEFENSE
W2E0003XQ
STUDENT HANDOUT**

CBRN Defense

Introduction

In 1936 a German scientist discovered a compound that killed insects but also had a highly undesirable effect on humans. He learned that it was 100-1,000 times more potent than chlorine, which was used in World War I. A few thousandths of a gram proved fatal. Unfortunately, many types of agents exist in military arsenals around the world today.

Importance

You will benefit from this instruction by being able to prepare for a CBRN attack, identify CBRN agents, and survive a CBRN attack.

In This Lesson

This lesson covers the following topics:

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Learning Objectives

Terminal Learning Objectives

TBS-CBRN-1001 Given a CBRN environment, a field protective mask (SL-3 complete), CBRN alarm and CBRN incident indicator, or an order to mask, employ the field protective mask (FPM) within a time limit of nine seconds of the issuance of the alarm, CBRN incident indicator, or an order.

TBS-CBRN-2301 Given a unit, a tactical scenario, a training area, and individual protective equipment, employ CBRN protective measures to prevent further contamination and complete the mission.

CBRN Defense (Continued)

**Learning
Objectives
(Continued)**Enabling learning objective(s):

TBS-CBRN-1001a Given a field protective mask (SL-3 complete), inspect mask for serviceability to ensure readiness for service.

TBS-CBRN-1001b Given a CBRN environment, a field protective mask (SL-3 complete), CBRN alarm and CBRN incident indicator, or an order to mask, don and clear field protective mask, within a time limit of nine seconds of the issuance of the alarm, CBRN incident indicator, or an order.

TBS-CBRN-1001c Given an evaluation, identify the types of CBRN alarms without error.

TBS-CBRN-1001d Given a scenario, apply selective unmasking concepts to prevent further contaminations and complete the mission.

TBS-CBRN-2301a Given individual protective equipment, inspect serviceability of equipment to ensure all equipment is complete and serviceable.

TBS-CBRN-2301b Given an evaluation, define each level of MOPP without omission.

TBS-CBRN-2301c Given a simulated chemical or biological attack, MOPP gear, a poncho, and a CBRN alarm or order, assume appropriate MOPP level to minimize chemical or biological casualties.

TBS-CBRN-2301d Given a simulated chemical or biological attack, identify decontamination procedures without error.

TBS-CBRN-2301e In a CBRN environment, individual CBRN protective equipment, while wearing a fighting load, perform basic functions while in MOPP to accomplish the mission.

Joint Service General Purpose Mask Serviceability

When you receive your Joint Service General Purpose Mask (JSGPM) and SL3 gear, ensure to make the following checks for serviceability.

- (1) Components. Inspect the mask to ensure mask and all components are present, clean and function properly.
- (2) Clear Eyelens Outset. Check for dirty, scratched or damaged eyelens outset that obstruct vision. Ensure outset locking tabs are not broken or cracked.
- (3) Carrier. Check carrier for damaged or missing straps, clips, or hook and pike fasteners.
- (4) M61 filter. Check filter lot number and barcode for expiration, readability, or damage, and ensure time patch assembly is not dark blue. Check for missing filter seal, cracks, dents, or holes. Inspect air passages to ensure they are not clogged and filter mounting lugs are operable, and alignment markings are present.
- (5) Waterproof bag. Inspect waterproof bag for cracks, tears, holes, and/or brittleness.
- (6) Faceform. When not used in training or a tactical situation, the mask will be stored with the faceform installed to keep the proper shape of mask assembly.
- (7) Head Harness. Check for loose stitching, cuts, rips, or tears and head harness straps still stretch.
- (8) Canteen Cap. Inspect for dirt, damaged coupler and tight connection. Dust cover is present and provides tight connection with drink coupler "O" ring. Inspect the canteen cap gasket and threads for cuts, tears, deterioration or distortion.
- (9) Facepiece.
 - a. Check the facepiece for tears and holes.
 - b. Check for permanent set affecting fit.
 - c. Visually inspect eyelens for cracks, cuts, scratches, stains or distortion to adversely affect vision.
 - d. Inspect head harness mounts, pivoting and ladder lock bucklers for damage.
 - e. Check outlet valve cover assembly for breaks or other damage, and ensure that the communications port cover is not broken.
 - f. Ensure front module body is not loose, communications port not damaged or clogged and drink tube lever and drink coupler are not damaged or missing.
 - g. Inspect outlet valve disk for damage or deterioration and seat and mounting post are not damaged.
 - h. Check drink tube lever operates internal drink tube properly.
 - i. Inspect filter mounts to ensure a tight fit(not loose). Inspect bar code and lot numbering on filter mount for damage.
 - j. Check self-sealing disk valves for missing, damage or deterioration.
 - k. Inspect mask interior to ensure chin cup and beard are not torn, damaged or show signs of deterioration or holes.
 - l. Check inlet disk valves, disk valve seat and valve mounting post for damage.

Joint Service General Purpose Mask Serviceability (Continued)

- m. Inspect vision correction support frame is for presence and damage, and alignment tabs are functional.
- n. Ensure nosecup is not torn, damaged or show signs of deterioration or holes.
- o. Ensure internal drink tube is not damaged, deteriorated, missing, and that it functions properly.
- p. Inspect microphone assembly for damage, corrosion, or dirt.

Protective Clothing

Without protective clothing it would be impossible to operate or even survive in a chemically contaminated environment, let alone continue carrying out the mission. With proper protective clothing Marines can survive in a chemically contaminated environment and operate and continue their mission.

Various armies around the world use different types of chemical protective clothing for individual protection. Two types are available in the United States Marine Corps. The “type” depends on the protection required, but all fall within two major divisions: Permeable and Non- Permeable.

Permeable protective clothing allows air and moisture to pass through the fabric. Most personnel use permeable protective clothing. Examples of permeable clothing are the:

- Suit, Chemical and Biological Protective, Carbon Sphere (Saratoga).
- Joint Service Lightweight Integrated Suit Technology (JSLIST) Chemical Protective Ensemble.

CBRN Equipment Serviceability

Gloves: Check the gloves for holes, cuts, rips, or cracks. Check that both gloves have legible markings for lot number, date of manufacture, and NSN. Runs in the rubber and dimples that do not pass through the rubber are acceptable defects in the material and do not affect serviceability.

Neck DAM: Inspect the neck dam for holes, cuts, tears, loose stitching, and ensure hook and pile fasteners function properly.

Suit: Inspect trousers for Form, Fit, and Function. Inspect barrier bag closure for continuous seal. Check out shell of trousers for holes, cuts, tears, or open seams. Check inner shell of trousers for holes, cuts, tears, or open seams. Check trouser zipper, buttons, suspenders/suspender clips, and

hook and loop areas for proper functioning. Inspect coat for Form, Fit and Function. Inspect barrier bag closure for continuous seal. Check outer shell of coat for holes, cuts, tears, or open seams, Check inner shell of coat for holed, cuts, tears, or open seams, Check coat zipper, buttons, draw strings, barrel locks, and hook and loop areas for proper functioning.

Alternative Footwear System: Check the overboots for holes, cuts, rips, or cracks. Check the pair of boots or a right and left overboot, and legible markings for lot number, date of manufacture and NSN. Runs in the rubber and dimples that do not pass through the rubber are acceptable defects in the material and do not affect serviceability.

Four Components of a Permeable Protective Ensemble

- Chemical protective suit.
- Field protective mask.
- One pair of green/black vinyl overshoes (GVO/BVO) or multipurpose over-boots (MULO's).
- Chemical protective glove set.

MOPP Analysis

Unit commanders must perform a situation-based MOPP analysis to determine the appropriate MOPP level. This analysis enhances the probability of mission success by balancing the reduced risk of casualties due to chemical/biological agent exposure against the increased risk of performance decrements and heat strain casualties as MOPP levels increase. Because there is no easy formula to use in deciding an appropriate MOPP level, commanders must consider three situation factors (Mission, Environment, Marine) when performing MOPP analysis by asking himself the questions listed in the following table.

MOPP Analysis

Mission Factors	Environmental Factors	Marine Factors
What is the mission? Is it offensive or defensive?	What is the ambient air temperature?	Are the Marines:
What is the likelihood of chemical agent employment?	What is the humidity?	Well hydrated and nourished?
What agents are likely to be employed?	What is the Wet Bulb Globe Temperature (WBGT) index reading for the unit's area of operation?	Well rested?
What is the expected warning time for agent employment?		Heat acclimatized?
		Physically fit and well trained?

<p>What additional protection, such as shelter and cover, is available?</p> <p>How physically demanding is the work that must be performed?</p> <p>How mentally demanding is the work that must be performed?</p> <p>How quickly must the mission be accomplished?</p> <p>What is the expected duration of the mission?</p> <p>What is the likely follow-on mission?</p> <p>Are adequate food and water supplies available?</p> <p>How important is the mission?</p> <p>What risks will it require?</p>	<p>Is it cloudy or sunny?</p> <p>Is it windy?</p> <p>Is it day or night?</p>	<p>Healthy?</p>
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MOPP Analysis (Continued)

The mission will greatly influence the amount of protection personnel need. When the threat of chemical/biological agent employment is high and expected warning time is low, a high level of MOPP is dictated to provide adequate protection. However, increased MOPP levels can lead to performance degradation. Additionally, the incidence of heat casualties among personnel performing physically demanding work becomes greater with increasing MOPP levels, especially in high temperatures. The more critical the mission, the more thorough the MOPP analysis must be. The impact of decreased performance and heat casualties from MOPP must be weighed carefully against the risk of casualties and potential mission failure due to chemical agents.

The ambient environmental conditions (outside weather/inside vehicles) must be known before beginning assessment of how these conditions will affect the ability to successfully complete a mission. The maintenance of full hydration is the most important factor influencing the work performance of personnel wearing MOPP in warm

environments. Dehydration negates the advantages of heat acclimation and high physical fitness.

Components of the MOPP levels. The six standardized MOPP levels, and a Mask Only Command are described in the table below. Their characteristics and components are:

MOPP Level	Components
MOPP Ready	JSGPM carried. Permeable protective ensemble available within two hours. Second ensemble will be available in six hours.
MOPP Zero	JSGPM carried. Permeable protective ensembles within arm's reach.
MOPP1	JSGPM carried. Chemical protective trousers and jacket worn. Within arm's reach are GVOs/BVOs
MOPP2	JSGPM carried. Chemical protective gloves within arm's reach. Worn are: <ul style="list-style-type: none"> • Chemical protective trousers and jacket. • GVOs/BVOs.
MOPP3	Chemical protective gloves within arm's reach. Worn are: <ul style="list-style-type: none"> • JSGPM and hood. • Chemical protective trousers and jacket. • GVOs/BVOs
MOPP4	Worn are: <ul style="list-style-type: none"> • JSGPM and hood. • Chemical protective trousers and jacket. • GVOs/BVOs. • Chemical protective gloves.
Mask Only Command	JSGPM is worn.

MOPP Analysis (Continued)

Persistent and Non-Persistent Agents Definitions.

- Persistent Agents. Any chemical agent that stays in an effected area for more than 12 hours.
- Non-Persistent Agents. Any chemical agent that stays in an effected area for less than 12 hours.

Identifying Persistent and Non-Persistent Attacks:

- Persistent Attacks: Defined as air bursting, ground contaminating (i.e., aircraft spray or air bursting munitions).

- **Non-Persistent Attacks:** Defined as ground bursting, air contaminating (i.e., mortars, rockets, artillery, bombs).

Nerve Agents

In 1936 a German scientist discovered a compound that killed insects but also had a highly undesirable effect on humans. He learned that it was 100-1,000 times more potent than chlorine, which was used in World War I. A few thousandths of a gram proved fatal. Germany began stockpiling this agent. Estimated stockpiles by the end of World War II varied from 70,000 to 250,000 tons. Unfortunately, many types of nerve agents exist in military arsenals around the world today. You will benefit from this period of instruction by being able to identify nerve agents, as well as survive a nerve agent attack.

Nerve agents are broken down into two broad categories: non-persistent and persistent.

***Persistence column represents moderate agent saturation on sandy terrain at 86 degrees Fahrenheit*

	Chemical Agent / Military Symbol	Appearance	Odor	Rate Of Action	Persistence	Use Designation	Protection Required
Nonpersistent Nerve Agents	Tabun GA	Colorless to brownish liquid	Faintly fruity if any	Very rapid. 15 minutes after absorption of lethal dose	Depends on munitions, weather and saturation. 1.5 hours at given conditions **.	Quick acting casualty agent	FPM and protective clothing for liquids

Nerve Agents (Continued)

	Chemical Agent / Military Symbol	Appearance	Odor	Rate Of Action	Persistency	Use Designation	Protection Required
Nonpersistent Nerve Agents	Sarin GB	Colorless liquid	None	Very rapid. 45 secs-15 minutes after absorption.	Depends on munitions, weather and saturation. 6.1 hours at given conditions**. Evap similar to H2O or kerosene.	Quick acting casualty agent	FPM and protective clothing for liquids
	Soman GD	Colorless liquid	Fruity, impurities give it the odor of camphor	Very rapid 45 sec-15 minutes after absorption.	Depends on munitions, weather and saturation. 10.6 hours for given conditions** Evaporates 4 times slower than H2O. Thickeners may be added to increase persistency	Quick acting casualty agent	FPM and protective clothing for liquids
	GF (Potential Nerve Agent)	Liquid	N/A	N/A	Depends on munitions, weather and saturation. 1.49 hours at given conditions** Evaporates 20 times slower than H2O.	Quick acting casualty agent	FPM and protective clothing for liquids
	GB2 (Binary Nerve Agent) 2 part weapon, compounds are not chemical agents, components are mixed in flight to form agent, easier and safer storage, transport and disposal						

Nerve Agents (Continued)

	Chemical Agent / Military Symbol	Appearance	Odor	Rate Of Action	Persistency	Use Designation	Protection Required
Persistent Nerve Agents	VX	Amber colored oily liquid (motor oil)	None	Very rapid 45 sec-15 minutes after absorption.	Depends on munitions, weather and saturation. 45 days at given conditions. Evaporates 1,500 times slower than H ₂ O.	Quick acting casualty agent	FPM and protective clothing for liquids
	Vx (V sub x) "V-gas"	Amber colored oily liquid (motor oil)	None	Very Rapid 45 sec-15 minutes after absorption.	10 times more volatile (vapor hazard) than VX Very persistent in comparison to G agents	Quick acting casualty agent	FPM and protective clothing for liquids
	VX2 (Binary Agent) 2 part weapon, compounds are not chemical agents, components are mixed in flight to form agent, easier and safer storage, transport and disposal						

Physiological Action on the Body - Nerve agents are a group of highly toxic chemicals that interfere with signals transmitted through the central nervous system. The enzyme cholinesterase (muscle relaxant) is blocked out, and the enzyme acetylcholine (muscle contractor) is built up, causing muscles to contract tighter and tighter.

Penetration of the Body - The number and severity of the symptoms depend on the quantity of the agent and the route of entry into the body:

- Eyes: Symptoms appear very rapidly (15 seconds-3 minutes). Liquid exposure of the eyes can kill in 1 to 10 minutes.
- Respiratory system: Symptoms appear slower (2-5 minutes) with terminal effects within 15 minutes. Lethal respiratory dosages can kill in 1 to 10 minutes.
- Skin: Symptoms appear much more slowly. Lethal doses may occur in 1 to 2 hours. Very small skin dosages sometimes cause local sweating and tremors with little other effect.

Nerve Agents (Continued)

Nerve Agent Exposure Symptoms. The following table lists mild and severe nerve agent exposure symptoms.

Nerve Agent Exposure Symptoms	
Mild Symptoms	Severe Symptoms
<ul style="list-style-type: none"> • Unexplained runny nose • Severely pinpointed pupils • Unexplained, sudden headache • Sudden drooling • Difficulty in seeing (dimness of vision (meiosis)) • Tightness in the chest or difficulty in breathing • Wheezing and coughing • Localized sweating and muscular twitching in the area of the contaminated skin • Stomach cramps • Nausea with or without vomiting • Tachycardia (A rapid heart rate, usually greater than 100 beats per minute) followed by bradycardia (heart rate less than 50) 	<ul style="list-style-type: none"> • Strange or confused behavior • Increased wheezing, severe difficulty in breathing, and coughing • Red eyes with tearing • Vomiting • Severe muscular twitching and general weakness • Involuntary urination and defecation • Convulsions • Unconsciousness • Respiratory failure • Bradycardia • Coma / DEATH

WARNING: Casualties with severe symptoms will not be able to treat themselves and must receive prompt buddy aid and follow-on medical treatment if they are to survive.

Protection Required. Due to the fact that nerve agents may enter the body through various routes of entry, total body protection is necessary. This amounts to the protective mask with the hood and the chemical protective clothing. Liquid agent penetrates ordinary clothing rapidly, however, significant absorption through the skin requires more time.

Nerve Agent Medicants. The following table describes the two types of nerve agent medicants.

Nerve Agent Antidote Kit Mark I (NAAK Mark I)	Convulsion Antidote for Nerve Agents (CANA)
<ul style="list-style-type: none"> • Three kits are issued to each Marine • Stored inside the mask carrier • Each kit is a set of 2 automatic injectors one contains <ul style="list-style-type: none"> ○ 2 mg of Atropine ○ 600 mg of 2PAMC1 • A plastic clip holds the injectors together 	<ul style="list-style-type: none"> • An auto injector containing a 2-milliliter volume of Diazepam, an anti-convulsant • Never used for self-aid • Used only for buddy aid.

Blood, Blister, and Choking Agents

The Iranians and Iraqis were both guilty of employing blister agents against each other during their eight-year war (1980-1988). In World War I allied forces faced the threat of choking agents. More than a quarter of all casualties in that war could be contributed to choking agents. The North Koreans and Chinese both have the capability to use blood agents against us. Do you now have a better appreciation of the threat that you face as a Marine on the future battlefield?

Standard Blood Agents and Their Characteristics. Most blood agents are cyanide-containing compounds, absorbed into the body primarily by breathing. All blood agents are classified as *non-persistent*. The three that we are concerned with are described in the table below.

	Chemical Agent / Military Symbol	Appearance	Odor	Rate Of Action	Persistency	Use Designation	Protection Required
Non-Persistent Blood Agents	Hydrogen Cyanide AC	Colorless liquid that quickly dissipates into gas	Faint odor, similar to bitter almonds or peach kernel (occasionally no odor detected in lethal doses)	Very rapid Incapacitation occurs within 1-2 minutes after exposure Death occurs within 15 minutes after exposure to a lethal dose	Short, due to its volatility, and once in a gaseous state dissipates quickly in the air	Quick acting casualty agent (suitable for surprise attack)	Mask only AC vaporizes so rapidly
	Cyanogen Chloride CK	Colorless, highly volatile liquid (quickly evaporates)	Pungent, biting Probably unnoticed because of its intense, irritating and tearing properties	Immediate intense irritation	Short Vapors may persist in jungle and heavy woods for some time under favorable weather conditions	Quick acting casualty agent Used for degradation of filter canisters or elements	Protective mask CK can break or penetrate the filters more readily than most other chemical agents
	Arsine SA	Colorless gas	Mild garlic	Effects are delayed from 2 hours to as much as 11 days	Short	Delayed casualty agent	Protective mask

Blood, Blister, and Choking Agents (Continued)

Standard Blood Agents and Their Characteristics (Continued):

	Cyanogen Chloride CK	Colorless, highly volatile liquid (quickly evaporates)	Pungent, biting Probably unnoticed because of its intense, irritating and tearing proper- ties	Immediate intense irritation	Short Vapors may persist in jungle and heavy woods for some time under favorable weather conditions	Quick acting casualty agent Used for degradation of filter canisters or elements	Protective mask CK can break or penetrate the filters more readily than most other chemical agents
	Arsine SA	Colorless gas	Mild garlic	Effects are delayed from 2 hours to as much as 11 days	Short	Delayed casualty agent	Protective mask

Physiological Action on the Body- From the name, you know they effect either the blood or circulatory system. They poison the cytochrome oxidase system; this prevents cell respiration and the normal transfer of oxygen from the blood to the body tissue. The pink color of the casualty's lips, fingernails, and skin suggests hydrogen cyanide (AC) poisoning.

Blood Agent Penetration of the Body-

- **Eyes.** Toxicity through the eyes varies from moderate for AC to none for SA.
- **Respiratory System.** Due to the properties of blood agents (highly volatile, low boiling points), most instances of contact in field environments will be with vapors/gas. Therefore, the main entrance to the body is through the respiratory system.
- **Skin.** Due to its properties, blood agents are not able to be absorbed through the skin in sufficient dosages to cause casualties.

Symptoms of Blood Agent Poisoning- All three of the blood agents we have discussed have definite differences in their symptoms. Therefore, we will discuss each one separately.

Blood Agent	Poisoning Symptoms
AC	High concentrations <ul style="list-style-type: none"> • Increased depth of respiration within a few seconds • Violent convulsions after 20-30 seconds • Stop breathing within 1 minute • Heart stops within a few minutes • Skin, lips, and fingertips will have a pink color Moderate concentrations <ul style="list-style-type: none"> • Dizziness, nausea, and headache appear very early

Blood, Blister, and Choking Agents (Continued)

Symptoms of Blood Agent Poisoning (Continued)

Blood Agent	Poisoning Symptoms
AC (Continued)	<ul style="list-style-type: none"> • Convulsions and death • Long exposure to low concentration • Lack of oxygen to muscles may cause damage to the central nervous system • Coma and convulsions may last for several hours or days • Irrationality, altered reflexes, and unsteady gait which may last for several weeks or longer <p>Recovery is complete</p>
CK	<p>A combination of AC and lung irritant; due to the intense irritant effect symptoms may not be noticed</p> <ul style="list-style-type: none"> • Immediate, intense irritation to the nose, throat, and eyes • Coughing, tightness in the chest, heavy flow of water from the eyes • Dizziness, unconsciousness • Breathing stops and death occurs in a few minutes • Convulsions, retching and involuntary urination and defecation may occur • If the effects are not fatal, persistent cough, bloody sputum, and abnormal (bluish, grayish, dark purple) skin color may appear.
SA	<p><u>Slight exposure</u>: headache, uneasiness</p> <p><u>Moderate exposure</u>: chills, nausea, vomiting</p> <p><u>Severe exposure</u>: anemia</p>

Protection Required- Because blood agents evaporate so quickly and blood agents in liquid are not likely to be encountered in the field, there is little chance of them being able to penetrate your skin. Therefore, the protective mask is all that is required

Aid for Blood Agent Poisoning-

Step	Self-Aid	Buddy Aid
1	Stop breathing, don, clear, and check your mask.	Ensure everybody's mask is on. If not, provide assistance.
2	Pass the alarm.	Pass the alarm. Notify a corpsman if a fellow Marine shows symptoms.

Standard Blister Agents and Their Characteristics- All blister agents are persistent, and may be employed in the form of colorless gases or liquids. They damage any tissue with which they come in contact. Blister agents are classified into one of three categories: mustards, arsenicals, and urticants.

Blood, Blister, and Choking Agents (Continued)

Mustards- Mustards are described in the below table.

	Chemical Agent / Military Symbol	Appearance	Odor	Rate Of Action	Persistency	Use Designation	Protection Required
Persistent Blister Agents	Levinstein Mustard H Distilled Mustard HD	Oily, colorless to amber liquid	Garlic, horse-radish like	Delayed - usually 4 to 6 hours until first symptoms appear. Some symptoms have occurred from 24 hours up to 12 days in rare cases.	Duration depends on quantity of liquid contamination, munitions used, terrain and soil, and weather conditions. In cold weather, can last for a week to months. Has caused blister after leaking into soil 3 years prior. HD evaporates about 5 times more slowly than GB.	Delayed acting casualty agent	Protective mask and permeable protective clothing for small droplets. Impermeable clothing for large droplets.
	Nitrogen Mustard HN-1	Oily, colorless to pale yellow liquid	Faint, fishy or musty	Delayed 12 hours or longer	Depends on munitions used and the weather. Somewhat shorter than HD	Delayed acting casualty agent	Protective mask and permeable clothing for small droplets Impermeable clothing for large droplets
	Nitrogen Mustard HN-2	Dark liquid	Fruity in high concentrations. Like soap in low concentrations	Skin effects delayed 12 hours or longer	Same as HD based on evaporation; however, less than HD because of instability.	Delayed acting casualty agent	Protective mask and permeable clothing for small liquid droplets. Impermeable clothing for large droplets.

Blood, Blister, and Choking Agents (Continued)

Mustards- Mustards are described in the table below (continued).

Persistent Blister Agents	Nitrogen Mustard HN-3	Oily liquid	None when pure	Most symptoms delayed 4-6 hours. In some cases eye irritation, tearing, and sensitivity to light develop immediately	Considerably longer than HD	Delayed acting casualty agent	Protective mask and permeable protective clothing for small liquid droplets. Impermeable clothing for large liquid droplets.
	Mustard-T mixture HT	Clear, yellowish liquid	Like garlic	Similar to HD	Depends on weather and munitions used. Duration is longer than HD	Delayed acting casualty agent	Protective mask and permeable clothing for small droplets. Impermeable clothing for large droplets.

Asernicals- Asernicals are described in the below table

	Chemical Agent / Military Symbol	Appearance	Odor	Rate Of Action	Persistency	Use Designation	Protection Required
Persistent Blister Agents	Lewisite L	Colorless to brownish liquid	Gerani- ums Very little if pure	Rapid Body absorbs L more rapidly through the skin than it absorbs the nitrogen mustards	Shorter than HD Very short under humid conditions	Moderately delayed acting casualty agent	Protective mask and permeable clothing for small droplets. Impermeable clothing for larger droplets.

Blood, Blister, and Choking Agents (Continued)

Asernicals- Asernicals are described in the below table (continued)

	Chemical Agent / Military Symbol	Appearance	Odor	Rate Of Action	Persistence	Use Designation	Protection Required
Persistent Blister Agents	Mustard-Lewisite Mixture HL	Dark, oily liquid	Garlic like	Immediate stinging sensation to the skin Reddens within 30 minutes. Blistering in approximately 13 hours	Depends on weather and means of delivery. Somewhat shorter than HD	Delayed acting casualty agent	Protective mask and permeable clothing for small droplets. Impermeable clothing for larger droplets.
	Phenyl-dichloro-arsine PD	Colorless liquid	None	Immediate effects on eyes. Effects on skin delayed from 30 minutes to 1 hour.	Duration is somewhat shorter than HD under dry conditions. Short duration when wet.	Delayed acting casualty agent	Protective mask and permeable clothing for small droplets. Impermeable clothing for larger droplets.
	Ethyl-dichloroarsine ED	Colorless liquid	Fruity, but biting and irritating	Irritating effects on the nose/ throat is intolerable after 1 minute at moderate concentrations Blistering is less delayed than HD.	Short	Delayed acting casualty agent	Protective mask and permeable clothing for small droplets. Impermeable clothing for larger droplets.
	Methyl-dichloro-arsine MD	Colorless liquid	None	Immediate irritation to eyes/nose. Blistering effect delayed several hours.	Relatively short	Delayed acting casualty agent	Protective mask and protective clothing

Blood, Blister, and Choking Agents (Continued)

Urticants, the last persistent blister agent category, are described in the table below.

Chemical Agent / Military Symbol	Appearance	Odor	Rate Of Action	Persistency	Use Designation	Protection Required
Phosgene Oxime CX	Colorless solid or liquid	Intense, penetrating, and violently irritating	Rapid	2 hours in soil Relatively non-persistent on surfaces and in water	Rapid acting casualty agent	Protective mask and protective clothing

Physiological Action on the Body. Blister agents damage any tissue with which they come into contact. They irritate and damage the eyes and lungs and blister the skin (although at different times after exposure). When inhaled, they damage the respiratory system; when absorbed, they cause vomiting and diarrhea. They do kill, but the casualty producing effects are mainly due to skin damage. Most blister agents are delayed in acting after exposure, with the exceptions of Lewisite and Phosgene Oxime.

Penetration of the Body. Because blister agents cover a broad spectrum of physical properties, they can enter through any of the normal channels (skin, eyes, respiratory tract, and digestive tract).

Symptoms of Blister Agent Exposure. All three classes of blister agents have similarities in their symptoms. However, there are differences:

Eyes		
Mustards	Arsenicals	Urticants
<ul style="list-style-type: none"> • The most susceptible • From 1-12 hours after exposure, depending on exposure, swelling of the soft, thin tissue around the eyes • May also be: <ul style="list-style-type: none"> ○ Gritty sensation in the eyes ○ Visible burns ○ Severe lacerations 	<ul style="list-style-type: none"> • Liquids cause severe and immediate damage • Immediate pain and eyelid twitching • Swollen shut in 1 hour 	<ul style="list-style-type: none"> • Violent irritation from vapors. • Heavy watering of the eyes.

Blood, Blister, and Choking Agents (Continued)

Symptoms of Blister Agent Exposure (Continued)

Skin		
Mustards	Arsenicals	Urticants
<ul style="list-style-type: none"> • Hot, humid weather increases the action • Different phases <ul style="list-style-type: none"> ○ Latent period, the time directly after exposure: For liquids, from 1-24 hours; for vapors, may be several days. No noticeable damage ○ Erythema period, the second phase: Skin looks similar to sunburn: affected area turns red and gets brighter and may also swell. In severe burns, may limit the motion of a limb ○ Vesication period: Blistering begins or increases. Small sores may form first and combine to form the blisters. At first, fluid inside the blister is almost clear and later starts yellowing. Fluid is not mustard ○ Resorption period: About 1 week after exposure. Blister fluid is resorbed into the body. 	<ul style="list-style-type: none"> • Liquids produce more severe sores on the skin than does Mustard • 10-20 seconds after exposure, stinging pain • At about 5 minutes, reddening of the skin, more pain, and itching • In 12 hours, blisters are well developed and painful • In 48-72 hours, the pain lessens 	<ul style="list-style-type: none"> • Immediate, severe burning with intense pain and Numbness • White area with a swollen ring around it appears within 30 seconds • A wheal forms in 30 minutes • The white area turns brown in 24 hours

Protection Required: Because blister agents attack any tissues with which they come into contact, whole body protection is needed. The chemical over-garment and mask with hood is adequate protection

Blood, Blister, and Choking Agents (Continued)

Aid for Blister Agent Poisoning- The following table below lists the steps for self and buddy aid for blister agent poisoning.

Step	Self-Aid	Buddy Aid
1	Stop breathing, don, clear, and check the protective mask.	Ensure everyone's mask is on. If not, assist them.
2	Pass the alarm.	Pass the alarm.
3	Immediately, decontaminate any part of the body that is showing symptoms of blister agent poisoning. Use the M295 Skin Decontamination Kit.	Ensure that personnel exposed to contamination, decontaminate all affected parts of their bodies.
4	For blister agent in eyes, use only water.	After decontamination, make certain that all personnel are in MOPP 4.
5	Following decontamination, don complete chemical over-garment.	
6	Once blisters form, cover them with a sterile bandage. If possible, avoid breaking the blisters; secondary infection may result.	

Standard choking agents and their characteristics: Choking agents were one of the first chemicals to be used in warfare (World War I), but they still have military significance due to their effects

Choking Agent / Military Symbol	Appearance	Odor	Rate Of Action	Persistency	Use Designation	Protection Required
Phosgene CG	Colorless gas	New mown hay, grass, or green corn. May not be detected until toxic levels are reached.	Delayed - 3 hours or more may elapse before exposure to a low concentration causes any ill effects. Immediate symptoms may follow exposure to a high concentration of CG.	Short. May persist for some time in low places under calm or light winds and stable atmospheric conditions.	Delayed acting casualty agent	Protective mask

Blood, Blister, and Choking Agents (Continued)

Standard choking agents and their characteristics: (continued)

Choking Agent / Military Symbol	Appearance	Odor	Rate Of Action	Persistency	Use Designation	Protection Required
Diphosgene DP	Colorless oily liquid	New mown hay, grain, or green corn	Delayed - 3 hours or more may elapse before exposure to a low concentration causes any ill effects. Immediate symptoms may follow exposure to a high concentration of DP	About 30 minutes to 3 hours in the summer 10-12 hours in the winter.	Quick or delayed acting casualty agent depending upon dosage rate	Protective mask

Physiological Action on the Body. Choking agents attack the lung tissue and are classified as lung damaging agents. Inside the body, they cause the cells of the lungs to swell and release fluid (pulmonary edema, also called “dry-land drowning”), which impairs the ability to breathe.

Penetration of the Body. Because it attacks the respiratory system, the point of entry is through inhalation.

Time Period	Symptoms
During and Immediately After Exposure	<ul style="list-style-type: none"> • Coughing • Choking • Tightness in the chest • Nausea • Occasionally headache, watering of the eyes, and vomiting
Internal	<ul style="list-style-type: none"> • A period after exposure in which the victim may be symptom free • Commonly lasts 2-24 hours, but may be shorter
After Initial Exposure	<ul style="list-style-type: none"> • Difficulty in breathing, rapid shallow breathing, possible skin color change. • Discomfort, apprehension and labored breathing followed by frothy sputum. • Shock-like symptoms such as pale, clammy skin may also appear

Blood, Blister, and Choking Agents (Continued)

Protection Required. Because choking agents attack the respiratory tract and irritate the eyes, only the protective mask is needed for protection.

Aid for Choking Agent. The table below lists the steps for self and buddy aid for choking agents.

Step	Self-Aid	Buddy Aid
1	Stop breathing, don, clear, and check your mask.	Ensure everyone's mask is on. If not, provide assistance.
2	Pass the alarm.	Pass the alarm.
3	Normal combat duties should continue unless there is respiratory distress.	Have the casualty rest and stay warm if possible. Keep casualty sitting up.
4	If possible, stay warm and rest. Work will increase the effects due to an increase in your breathing rate.	Be alert for the signs of shock and treat as necessary.
5	Do not lay down flat. Sit up and rest.	If casualty is to be moved by stretcher, do <u>not</u> let him lie down. This will cause the fluid in his lungs to possibly choke him.

Biological Agents

History teems with examples of biological research and warfare. To eliminate a threat from Native Americans in 1763, the British commander at Fort Pitt distributed blankets and handkerchiefs contaminated with small pox. This example is one of the many ways in which biological agents can be disseminated. Biological agents, which are inexpensive, simple to produce, and easy to conceal, have been widely used throughout history. The benefit of this instruction is that you will be better able to prepare your unit's biological defense readiness to reduce casualties and maintain combat effectiveness.

Classification of Biological Agents. Biological agents are classified according to their:

- Biological Type
- Use
- Operational Effects
- Physiological Action

The terms persistent and non-persistent describe the continuing hazard posed by the agent remaining in the environment and should not be used to classify biological agents.

Biological Agents (Continued)

Types of Biological Agents. The types of biological agents are:

- Pathogens
- Toxins
- Other agents of biological origin, such as bio-regulators/modulators

Pathogens are disease producing micro-organisms that are either:

- Naturally occurring; (bacteria, rickettsia, fungi, viruses)
- Altered by genetic engineering

While the vast majority of microorganisms are harmless or even helpful, about 100 naturally occurring pathogens could be used as biological warfare agents. Pathogens can be further classified as:

- Transmissible agents that cause disease that is transmissible from person to person, which can lead to an epidemic. Others occur primarily in animals, but can be transmitted naturally to humans. These are important antipersonnel agents because the average person has very little natural or acquired immunity.
- Non-transmissible agents cannot spread from person to person, such as toxins, because they are not living organisms and are therefore non-transmissible.

Toxins are poisonous substances, highly toxic to man, produced as by-products of microorganisms, plants, and animals. Toxins can be:

- Chemically synthesized.
- Artificially produced with genetic engineering techniques

Toxins are nonliving materials so they are:

- Stable
- Readily available
- Easy to manage

Toxins can be disseminated in the same manner as chemical agents (extremely important because of the threat they can present in biological warfare). Toxins exert their lethal or incapacitating effects by interfering with certain cell and tissue functions. Toxins are classified as:

- Neurotoxins, which disrupt nerve impulses.
- Cytotoxins, which destroy cells by disrupting cell respiration and metabolism

Detection Kits

Once a unit is attacked with chemical weapons or suspects that chemical agents are present, it must have a way of verifying the chemical presence and type. Without this ability Marines would not be able to survive and fight on the battlefield. Imagine a whole battalion of Marines, almost 1,000 strong, walking through an area that is contaminated.

Detection Kits (Continued)

The resulting scene would be devastating and chaotic. This class will benefit you by enabling you to use some of the detection kits we have to locate and verify contamination at the conclusion of this class.

M256A1 Chemical Agent Detector Kit

Purpose	Description	Capabilities
To detect and classify toxic chemical agents present in vapor or in liquid form	<p>Consists of a carrying case with:</p> <ul style="list-style-type: none"> • An adjustable shoulder strap • A hook and pile top case fastener to prevent accidental opening of the case • A waste belt attachment strap • Identification and information data on the top of the case <p>12 individually wrapped M256 Chemical Agent Sampler-Detectors, consisting of:</p> <ul style="list-style-type: none"> • Six glass ampules filled with a chemical reagent • Three test spots <p>Channels are formed in the plastic sheet to direct the flow of reagent to the test spots. Printed on the back of each sampler detector are: SAFE/DANGER warnings to show the approximate color each test spot develops if the agent is or is not present.</p> <ul style="list-style-type: none"> • A chemical heater with two glass ampules • A protective strip • A rubbing tab • A lewisite detecting tablet • One book (25 sheets) of ABC-M8 VGH chemical agent detector paper (M8 paper). • A set of operational instruction cards. 	<p>Within 20 minutes detects:</p> <ul style="list-style-type: none"> • Nerve agents • Blood agents • Blister agents <p>M256 Chemical Agent Sampler-Detectors specifically detects in vapor form:</p> <ul style="list-style-type: none"> • AC • CK • CX • H Series (H, HN, HD) • L • V • G <p>M8 Paper specifically detects in liquid form:</p> <ul style="list-style-type: none"> • V • G • H

Detection Kits (Continued)

M256 Operating Procedures. The operating procedures are identified in the table below.

Step	Action
1	Open the Sampler Protector <ul style="list-style-type: none"> After removing the operational instruction cards from the box and reading the instructions, carefully remove a sampler detector from the protective bag (retain bag to refer to instructions) Examine the sampler-detector for any broken or missing ampoules, missing spots, or crushed reagent channels. Check blood agent spot for a pinkish color. If any of these conditions exist, do not use.
2	Swing out heater; remove and save two loose pads. Swing heater back in.
3	Remove and discard pull-tab marked #1 to expose lewisite detecting tablet.
4	Rub top half of paper tab #2 on the lewisite detecting tablet.
5	Hold sampler-detector with arrow pointing up (test spots up).
6	Using the heater pads, crush four ampoules in the three center pockets marked #3.
7	Turn sampler-detector with arrow down (test spots down) and insure wetting of test spots by squeezing ampoules with the heater pads to force liquid through formed channels.
8	With arrow still pointing down, place your thumb over the middle spot on the protective strip.
9	Swing heater away from test spot.
10	Being sure to vent the heater vapors away from your body and <u>not</u> using the heater pads, crush one green ampoule marked #4. Immediately swing heater back over the test spot.
11	After 2 minutes, swing heater away from test spot and protective strip away from test spots.
12	Expose test spots for 10 minutes (avoid direct sunlight).
13	After 10 minutes, being sure <u>not</u> to use heater pads, crush the second green ampoule marked #4 on the heater (vent vapors away from body). Swing heater immediately over test spot.
14	After 1 minute over test spot, swing heater away from test spot.
15	Hold sampler-detector with arrow down (test spots down).
16	Using heater pads crush the remaining ampoules marked #5. Be sure to wet test spots by squeezing ampoules with pads to force liquid onto the test spots.
17	Re-rub bottom half of paper tab marked #2 on the lewisite detecting tablet.
18	Turn the sampler-detector over to determine safe or dangerous conditions. Check lewisite tab markings for a difference in color between the first and second rub marks. Safe/danger color observations: <ul style="list-style-type: none"> The blister agent test spot is safe when it is colorless. Purple or blue indicates H series; red or purple indicates presence of CX.

Detection Kits (Continued)

M256 Operating Procedures. (Continued)

18	<ul style="list-style-type: none"> • The blood agent test spot is safe when it remains colorless or tan. Pink indicates a weak concentration; blue, strong. • The nerve agent spot is blue-green or darker when safe. It is colorless or peach colored when a nerve agent is present. • Lewisite is present when the second rub mark turns olive green. When both the first and second rub marks are tan, it is safe. • On the blister agent test spot, high temperatures may cause the spot to turn blue even in the absence of H series agents. • At low concentrations or high humidity a change in the lewisite tablet rub mark may be very slight. Ensure you compare the two marks carefully. • The blood agent detector spot may turn dull yellow and orange when no agent is present. A pink or blue color change must be present to be positive. If a test spot is pink before exposure, discard the sampler-detector. • If blood agent is indicated, repeat the testing with a fresh sampler-detector. If blood agent is not present on the second test, blood agent is not present. If it is present on the second test, blood agent is present.
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ABC-M8 Chemical Agent Detector Paper. ABC-M8 detector paper is used to detect the presence of liquid V, G, or H (H, L, and CX). It comes in a booklet with 25 sheets of chemically treated impregnated paper, perforated for easy removal. The 25 sheets may be torn in two to conduct 50 separate tests. A color comparison chart is printed on the inside of the front cover of the book

Function: When M8 paper is brought into contact with liquid nerve or blister agents, it reacts with chemicals in the paper to produce specific color changes:

- Yellow indicates presence of G-agent.
- Red indicates presence of blister agents (H, L, and CX).
- Dark green indicates presence of V-agent.

Detection Kits (Continued)

ABC-M8 Chemical Agent Detector Paper Procedures. Follow the steps in the following table to use ABC-M8 Chemical Agent Detector Paper.

Step	Action
1	Tear out a sheet of M8 paper. If perforated, use half a sheet.
2	Blot, do not rub, the surface where liquid contamination is present. Observe for color change.
3	Compare any color change with the typical colors shown on inside cover of the book of M8 paper. Some: <ul style="list-style-type: none">• Decontaminants will give false positive tests on M8 paper. In an area where decontaminants have been used, positive results on the M8 paper must be confirmed by tests with a sampler-detector.• G-agents will turn a red-brown color, which is between typical H and G color.

M9 Chemical Agent Detector Paper Characteristics:

- Can detect all liquid chemical agents
- Does not detect vapors
- Is issued in a roll, two inches wide and thirty feet long, contained in a cardboard dispenser with a cutter edge
- Is olive drab
- Has a brown paper strip that protects an adhesive back until dispensed from the roll
- Will stick to vehicles, clothing, and other equipment
- When the paper comes in contact with a liquid chemical agent, the dye in the paper reacts with the agent to form pink, red, red-brown, or red purple spots or streaks.

Decontamination Kits

The modern day battlefield is full of potential risks from conventional weapons. Add to that the threat of CBRN weapons (unconventional), and you end up with a lot of CBRN survival skills that must be second nature to ensure your survival. Properly using decontamination kits and apparatuses will enhance the probability that you will survive the initial dangers of a CBRN attack.

M291 Skin Decontaminating Kit. The M291 kit allows you to completely decontaminate your skin through physical absorption, neutralization and removal of a toxic agent with no long-term harmful effects. This kit can be used for both combat and training. Each kit consists of a wallet-like carrying pouch containing six individual decontamination packets, enough for three complete skin decontaminations. Each decontamination kit contains an applicator pad filled with decontamination powder. You will practice with this kit during the CBRN Defense Practical Application.

Decontamination Kits (Continued)

Reactive skin decontamination lotion (RSDL). The RSDL is a liquid decontaminant dispensed on a sponge. It is expected to replace the M291. It washes away chemical agent contamination and also neutralizes the effects of many agents. The RSDL can be used for decontamination of intact skin around wounds, but it is not approved for the decontamination of wounds.

Once aware of chemical-biological (CB) contamination on the bare skin, initiate immediate decontamination techniques, without command, by using the M291 Skin decontamination kit. Start the skin decontamination technique within 1 minute of becoming contaminated. Some toxic chemical agents, especially nerve agents, kill within minutes.

- Chemical. Use the M291 kit within 1 minute of contamination of the exposed skin. If a M291 is not available, chemical contamination may be blotted from the skin with a cloth and flushed with water from a canteen. Soap (if available) can be used to wash the agent from the skin.
- Biological. Immediately decontaminate using soap and water when there is a suspected exposure to a BW agent. Grossly contaminated skin surfaces should be washed with a 0.5% chlorine solution, if available, with a contact time of 10 to 15 minutes.
- Radiological. To remove radiological dust particles, brush, wash, or wipe them off. If MOPP gear is wet, conduct a MOPP gear exchange as soon as possible because brushing or shaking will not remove the contamination. Wash the exposed areas of the skin with soap and water, and pay particular attention to the hair and fingernails.

Eye Decontamination. Due to the charcoal-like properties of the M291, your eyes must be decontaminated with water only. Follow the steps below to decontaminate your eyes.

Step	Action
1	Take out your canteen (not the canteen with the M1 drinking cap).
2	Open your canteen.
3	Lean forward with your head away from your clothing.
4	Stop breathing.
5	Lift your mask so it sets on top of your head.
6	Tilt your head to the right.
7	Place open end of your canteen at the bridge of your nose between both eyes.
8	Pour water into your right eye. Notes: Do not rub. Keep water from your clothing.
9	Now tilt your head to the left.

Decontamination Kits (Continued)

Eye Decontamination (Continued)

10	Pour water into your left eye. Notes: <ul style="list-style-type: none"> • Do not rub. • Keep water from your clothing.
11	Replace mask, clear it, and check it. Resume normal breathing.
12	Replace your canteen cap.
13	Put canteen back into canteen carrier and secure snaps.

CBRN Defense Alarms, Signals, and Immediate Action

When you begin training your unit to survive on the modern battlefield, rest assured that you will end up with two classes of Marines in the event of a CBRN attack: The quick and the dead. This period of instruction will benefit you by making you able to prepare your unit's personnel to survive a CBRN attack and carry on the mission.

Indicators of CBRN Attacks. Enemy CBRN attacks may come with little or no warning. Your ability to recognize attack indicators will increase the speed at which you react to a CBRN attack, which will increase your chances of survival.

- Nuclear Attack Indicators. Nuclear attack indicators are unmistakable:
 - Bright Flash
 - Enormous Explosion
 - High Winds
 - Mushroom shaped cloud

Biological Attack Indicators. Biological agents may be disseminated as aerosols, liquid droplets or dry powder. Biological attack indicators fall into two groups:

1. High probability indicators. Attacks with biological agents will be very subtle if favorable weather conditions prevail. Symptoms can appear from minutes to days after an attack has occurred. High probability indicators may be the:
 - Mysterious illness. Many Marines and civilians sick for an unknown reason.
 - Large numbers of or unusual insects
 - Large numbers of dead wild or domesticated animals
 - Mass casualties with:
 - Flu-like symptoms
 - Fever
 - Sore Throats
 - Skin rash
 - Mental abnormalities
 - Pneumonia

CBRN Defense Alarms, Signals, and Immediate Action (Continued)

- When you begin training your unit to survive on the modern battlefield, rest assured
- Diarrhea
- Dysentery
- Hemorrhaging
- Jaundice

2. Possibility Indicators. Indicators of a possible biological attack are any:

- Artillery shells with less powerful explosions than High Explosive (HE) rounds.
- Aerial bombs that “pop” rather than explode.
- Mist or fog sprayed by aircraft or aerosol generators.
- Unexploded bomblets found in the area.

Chemical Attack Indicators. Explosive shells, rockets, missiles, aircraft bombs, mines, and spray devices can disperse chemical agents. Also, either water-soluble or miscible liquids or solids may potentially contaminate water supplies. The means of delivery does not in itself help identify chemical agent attacks. Chemical attack indicators fall into two groups:

1. High probability indicators. High probability indicators may be the:

- Activation of chemical alarms.
- Positive reading on chemical agent:
 - Detector paper
 - Monitor
- Marines experiencing symptoms of chemical agent poisoning such as:
 - Irritation of the eyes, nose, throat, and skin
 - Headache
 - Dizziness
 - Nausea
 - Difficulty with or an increase in rate of breathing
 - Choking
 - Tightness in chest
- Mist or fog sprayed by aircraft

2. Possibility indicators. Indicators of a possible chemical attack are:

- Artillery shells with less powerful explosions than HE rounds
- Aerial bombs that “pop” rather than explode.
- Unexploded bomblets found in the area.

CBRN Defense Alarms, Signals, and Immediate Action (Continued)

Automatic Masking. Automatic masking is the act of immediately masking and assuming MOPP4 when encountering chemical or biological attack indicators on the battlefield. When high probability indicators are present, Marines will automatically mask before initial chemical or biological weapons usage is confirmed. Once chemical and biological agents have been employed, commanders at all levels may establish a modified automatic masking policy by designating additional events as automatic masking criteria. Once this policy is disseminated, Marines will mask and assume MOPP4 automatically whenever one of the designated events occurs.

If individuals find themselves alone without adequate guidance, they must mask immediately and assume MOPP4 whenever:

- Their position is hit by artillery, mortar fire, rocket fire, or by aircraft bombs, and chemical agents have been used or the threat of their use is significant.
- Their position is under attack by aircraft spray.
- Smoke or mist of an unknown source is present or approaching.
- A suspicious odor, liquid, or solid is present.
- A chemical or biological attack is suspected
- Unexplained laughter or unusual behavior is noted in others.
- Buddies suddenly collapse without evident cause.
- Animals or birds exhibit unusual behavior and/or sudden unexplained death.

If individuals find themselves alone without adequate guidance, they must mask immediately and assume MOPP4 whenever they have one or more of the following signs or symptoms:

- An unexplained sudden runny nose.
- A feeling of choking or tightness in the chest or throat.
- Blurring of vision and difficulty in focusing the eyes on close objects.
- Irritation of the eyes, this could be caused by the presence of several chemical agents.
- Unexplained difficulty in breathing or increase in breathing.
- Sudden feeling of depression.
- Anxiety or restlessness.
- Dizziness or light-headedness.
- Slurred speech.

Once Marines are under attack, they must warn others of the hazard. Early warning gives others more time to react; this additional time saves lives and increases mission effectiveness. Apply the following rules when giving the alarm:

- Give the alarm as soon as an attack or a hazard is detected

CBRN Defense Alarms, Signals, and Immediate Action (Continued)

- Use an alarm method that cannot be confused easily with normal combat signals or sounds. Personnel should warn others using one or a combination of the four types of alarms/signals for warning personnel of an attack
 - Vocal
 - Visual
 - Sound
 - Audio-visual
- All who hear or see the alarm must repeat it swiftly throughout the unit because of its limited range.
- Supplement the alarm over radio and telephone nets.

Alarm Method	
Vocal	<p>The spoken word (vocal alarm signal) is the first way to inform troops of a CBRN hazard or attack. The vocal alarm for:</p> <ul style="list-style-type: none"> • Any chemical or biological hazard or attack is the word “GAS!” Use the word “SPRAY!” for an aircraft spray attack. • The person giving the alarm masks first and then shouts “GAS!” as loudly as possible. • Everyone hearing this alarm immediately masks and then repeats the alarm <p>The arrival of radiological contamination in a unit area is the word “FALLOUT!”</p> <ul style="list-style-type: none"> • The first person to detect the arrival of fallout will usually be a radiological monitor operating a radiacmeter at the unit command post (CP). When this radiacmeter records an increase in dose rate to 1 centigram per hour or higher, the monitor should immediately alert unit personnel by shouting “FALLOUT!” • Everyone hearing this alarm takes cover immediately and then repeats the alarm.
Visual	<p>The visual alarm is always used in conjunction with the vocal alarm. It reinforces the vocal alarm to warn of the imminent arrival or the presence of CBRN hazards. The visual alarm is a standard hand-and-arm signal that consists of the following steps:</p> <ul style="list-style-type: none"> • Don, clear, and check the FPM. • Extend both arms horizontally sideways with clenched fists facing up. • Move the fists rapidly to your head and back to the horizontal position. • Repeat as necessary.

CBRN Defense Alarms, Signals, and Immediate Action (Continued)

Alarm Method	
Sound	<p>Sound signals reinforce vocal and visual alarms to warn of the imminent arrival or the presence of CBRN hazards. Sound signals consist of a succession of short signals. Examples of sound signals include:</p> <ul style="list-style-type: none"> • Rapid and continuous beating on any metal object or any other object that produces a loud noise. • A succession of short blasts on a vehicle horn or other suitable device, in a ratio of 1:1 (approximately 1 second on and 1 second off). • An interrupted 10-second warbling siren sound and vocal alarms in situations in which the sound is lost because of battlefield noises or in which sound signals are not permitted.
Audiovisual	<p>If the automatic chemical agent alarms are in operation, detected agents will trigger a visual and auditory alarm unit. The person who sees or hears an alarm signal from the alarm unit immediately masks and augments this signal with the vocal signal. Radio/telephone operators who hear the vocal signal immediately mask and relay the signal over the unit radio and telephone nets. Personnel reinforce this signal with other sounds or visual signals.</p>

Actions Performed Before a CBRN Attack. The actions taken before an attack are most critical because they will increase the unit's survivability to the greatest possible extent. These actions range from selecting the right shelters, fortifying those shelters, and protecting vital equipment and personnel, to using equipment to increase survivability.

Hardening Positions and Protecting Personnel. Hardening includes anything that makes a unit more resistant to the effects of enemy strikes. This reduced vulnerability makes a unit a less lucrative target. Hardening includes:

- **Readying the positions.** Hardening of positions includes all actions to make them more resistant to the blast effects of conventional or nuclear weapons, to the heat and radiation of nuclear weapons, and to the contamination of biological or chemical weapons. Foxholes and bunkers with strong waterproof overhead cover provide excellent shelter. Tanks and other armored vehicles in defilade are good CBRN shelters. Existing natural and man-made features, such as caves, culverts, tunnels, and empty storage bunkers, offer expedient shelter. Shelters do not always adequately protect against vapor hazards. In fluid battlefield situations each unit establishes a command post in a protected or built-up area to provide maximum protective shelter for off-duty personnel and critical equipment. Route reconnaissance locates handy shelters, such as culverts and overpasses. Commanders schedule stops near these shelters.
- **Readying the personnel.** Ordinary garments offer significant protection from flash burns of a nuclear explosion. Under battlefield nuclear warfare (BNW) conditions, personnel use gloves, scarves, and headgear to protect normally exposed portions

CBRN Defense Alarms, Signals, and Immediate Action (Continued)

of the body; these items should be made readily available. Under the threat of enemy chemical or biological attacks, leaders ensure protective equipment is prepared and readily available and that the unit maintains good field sanitation and personal hygiene.

- Positioning alarms and monitors. Units position organic systems to detect chemical contamination or nuclear fallout. They position alarms upwind of friendly positions. Unit personnel place detector paper in positions that give them maximum exposure to chemical agents. Leaders disperse radiological monitoring teams for best coverage of potential radiological contamination.

Before Nuclear Attack:

- Prepare personnel tactically and psychologically for nuclear defense
- Instruct personnel on the effects of a nuclear detonation
- Indoctrinate personnel in the protective measures for blast, heat, and nuclear radiation.
- Be alert for the following indications of nuclear attack
 - Appearance of enemy personnel wearing special equipment and clothing.
 - Unusual enemy movement or withdrawal from forward areas
 - Registration of heavy artillery with high air bursts.
 - Harden positions

Before Biological Attack:

- Ensure personnel receive all immunizations and medications.
- Provide personnel with serviceable protective masks.
- Instruct personnel in the proper wearing and maintenance of the FPM.
- Maintain physical fitness of the unit through physical conditioning exercises and attention to personal cleanliness and field sanitation. Effective control of rodents and insects is a hygiene priority.
- Permit personnel to eat and drink only approved food and water.
- Instruct personnel on biological attack indicators.
- Alert higher headquarters and subordinates of a possible attack.

Before Chemical Attack:

- Conduct a thorough training program to indoctrinate personnel on the various characteristics of the agents and the three phases of defensive operations: detection, protection, and decontamination.
- Conduct training in the use of special equipment used to identify and detect chemical agents.
- Provide personnel with FPMs and other protective and detection equipment.
- Ensure personnel are trained in the use of self-protection, first-aid methods, and antidotes.
- Conduct training in decontamination procedures.
- Instruct personnel on chemical attack indicators.

CBRN Defense Alarms, Signals, and Immediate Action (Continued)

- Ensure personnel are alert to detect and sound the alarm for a chemical attack.

Actions Performed During a CBRN Attack. Personnel must immediately act to reduce the impact of a CBRN attack. Specific actions will vary according to the type of attack.

During Nuclear Attack. An enemy nuclear attack would normally come without warning. The first indication is a flash of intense light and heat. Induced radiation arrives with the light. Blast and hurricane-like winds follow within seconds. Initial actions must, therefore, be automatic and instinctive — drop immediately and cover exposed skin to protect against the blast and thermal effects. If exposed when a detonation occurs, Marines must:

- Immediately drop facedown. A log, large rock, or any depression in the earth's surface provides some protection.
- Close eyes. Protect exposed skin from heat by putting hands and arms under or near the body and keeping the helmet on.
- Remain facedown for 90 seconds or until the blast wave passes and debris stops falling.
- Stay calm. Cover mouth or mask up and check for injury. Check weapons and equipment damage. Prepare to continue the mission.

Marines in fighting holes can take additional precautions. The fighting hole puts more earth between Marines and the potential source of radiation.

- They can curl up on one side, but the best position is on the back with knees drawn up to the chest. This belly up position may seem more vulnerable, but arms and legs are more radiation-resistant and will protect the head and trunk.
- Store bulky equipment, such as packs or radios, in adjacent pits if they prevent Marines getting low in their fighting positions, or place these items over the face and hands for additional radiation and blast protection.

During Biological Attack. If enemy forces attack with biological agents, Marines may have little or no warning; Marines must automatically mask when they recognize biological attack indicators. Putting on the FPM and keeping clothing buttoned up protects adequately against living biological agents, as well as applying insect spray or repellant. But, an agent can gain entry through clothing using two routes:

- Openings, such as buttonholes, zipped areas, stitching, and poor sealing at ankles, wrist, and neck.
- Through minute pores in the fabric of clothing.
- Putting on the protective ensemble (MOPP gear) greatly increases the protection level of personnel.
- Toxins require the same amount of protection as liquid chemical agents.
- Since no rapid-warning biological agent detection device is fielded, consider any known agent cloud as a chemical attack. Take the same actions prescribed for a

CBRN Defense Alarms, Signals, and Immediate Action (Continued)

chemical attack. To counter a biological attack; protective measures must be initiated before an attack.

During Chemical Attack. Warning of a chemical attack may come from automatic alarm, vocal or visual signal, color change of detector paper, or symptoms observed in oneself or another.

- The first reaction to recognizing chemical attack indicators should always be to mask up and then give the alarm.
- Personnel take whatever cover is readily available to reduce the contaminants landing on the body. For aerial spray attacks this will involve crouching on the ground and completely covering oneself with the poncho.
- Personnel conduct immediate decontamination as necessary to remove all contaminants from the skin.
- Liquid chemical agents can penetrate normal clothing, leather boots, and gloves; personnel must don MOPP4 for full protection.
- If over-garments are not available at time of attack, personnel must use field-expedient protection measures. For example, as a temporary expedient, personnel can use their protective mask with hood, protective gloves, wet weather parka, utility uniform, field boots, load-bearing equipment, etc. However, the poncho provides protection for only 1 to 3 minutes as a cover against a liquid chemical agent.

Action Performed After a CBRN Attack. Following a CBRN attack, post-strike actions must be accomplished to restore fighting power and prepare to continue the mission.

After Nuclear Attack: Post-strike actions include damage assessment and restoration of combat power. Leaders must maintain control and take contingency actions quickly. Replace cover and ready weapon systems to restore fighting power. Action must also be taken to prepare for fallout. As a minimum, unit:

- Personnel cover fighting holes and shelter openings.
- Radiac operators begin continuous monitoring.
- Personnel cover exposed skin with their poncho or don MOPP gear.
- Personnel cover their mouths with handkerchiefs to reduce the probability and amount of contaminants entering the lungs. This method, generally preferable to masking, avoids trapping contaminants in the mask filter.

After Biological Attack. Actions after a biological attack include taking samples, identifying a casualty by the symptoms they exhibit, and treating those symptoms. Early recognition of symptoms and their treatment will decrease recovery time and hopefully decrease fatalities. Personnel:

- Should strive to keep their bodies, clothing, and living areas clean.

CBRN Defense Alarms, Signals, and Immediate Action (Continued)

- Must observe each other for illness. Sickness may not occur for a few hours to days after a biological attack.
- Must start decontamination measures:
 - Boil water for 15 minutes if not sealed
 - Boil or wash sealed containers of food thoroughly before the seal is broken.
 - Expose contaminated objects to direct sunlight.
 - Wash exposed skin/areas with soap and water.
 - Add purification tablets to water.
 - Cook food prior to eating.

After Chemical Attack. After a chemical attack, MOPP levels may be adjusted as appropriate for the type of hazard and mission. If necessary, Marines will continue to fight in MOPP4. When time allows, personnel will conduct decontamination to remove FPMs and reduce MOPP.

- Personnel will wear FPMs until receiving the command to unmask.
- Personnel must reorganize and continue the mission.
- Casualties will be treated and evacuated.
- Weapons, equipment, and living areas must be decontaminated as necessary
- MOPP gear exchange is conducted as necessary.
- Continued reassessments are needed of available hazard information and mission requirements to ensure that MOPP levels are not set too high.

Survey Functions

After contamination is detected, survey techniques determine the location and size of the contamination. This resource-intensive operation is typically conducted in rear areas to prevent units from unknowingly entering the contaminated area.

The following are critical tasks conducted during an NBC survey:

- Locate the general boundaries of the contaminated area.
- Place warning markers at specified intervals around the contaminated area and at all entry points.
- Determine the intensity of the contamination.
- Report information via and NBC 4 report.

NBC surveys define the boundaries of contaminated areas. All survey techniques require applied judgement based on METT-TC. The mission, the terrain, and the enemy indicate the technique that should be used. There are three survey techniques that can be employed when contamination is located-nearside-farside, box, and star. The techniques are usually performed mounted to minimize the exposure of survey personnel to NCB hazards; however, they can be performed dismounted.

There are two types of surveys-complete and incomplete. A complete survey occurs when the entire extent of the contamination has been identified. An incomplete survey

Survey Functions (Continued)

occurs when the entire extent of the contamination has not been identified, such as when an NBC reconnaissance unit must conduct a survey to find a bypass route. The detection equipment used to conduct surveys varies based on the situation and the threat. Equipment and system operating instructions are found in applicable operator and crew service and technical publications.

Marking

Once an area is searched and contamination is located, the area is surveyed (if required) and marked and a report is submitted to the requesting headquarters. Marking a contaminated area or equipment designates a hazard. A more detailed survey determines the extent and intensity of the contamination. Markings warn individuals and units visually, identify routes through or around contamination to maximize operational maneuverability, and identify equipment that is hazardous to operators and maintenance personnel.

Contamination Marking

The NBC contamination marking set used by US forces contains all the material needed to mark contaminated areas. The marking set contains the following:

- Flag containers (each container holds 60 [20 white, 20 blue, and 20 yellow] NBC contamination marking flags).
- Mounting stakes (48 each to make poles and attach marking ribbon).
- A ribbon container (contains thirteen 20-meter rolls of marking ribbon for hanging flags between poles or other objects).
- Crayons for marking information on flags.

Contamination marking sigs are standardized in color, shape, and size. The primary (background) color of the marking sign indicates the general type of contamination. The secondary (foreground) color identifies the specific hazard. Contamination marking signs are annotated with important information that includes the following data fields:

- Chemical: Post the name of the agent, if known, and the date and time of detection. The contamination marker will have yellow background with red lettering.
- Biological: Post the name of the agent, if known, and the date and time of detection. The contamination marker will have blue background with red lettering.
- Radiological: Post the dose rate, the date and time of the reading and the date and time of the burst, if known. The contamination marker will have a white background with black lettering.

MOPP Gear Exchange

As an officer you will be responsible for ensuring that your unit can survive and accomplish their mission on the modern battlefield. Once the battlefield becomes contaminated, expect to be in MOPP gear for several hours without relief. To maintain your unit's combat effectiveness, your Marines must be prepared to perform MOPP gear exchange. The benefit of this instruction is that following it you will be able to perform, supervise, and instruct buddy team and individual MOPP gear exchange operations.

Purpose of MOPP Gear Exchange. The purpose of MOPP gear exchange is to:

- Limit the spread of contamination.
- Allow temporary relief from MOPP4.
- Facilitate additional decontamination requirements.

MOPP gear exchange is one half of operational decontamination. Operational decontamination is designed to be performed at squad level, but can be performed at platoon levels. MOPP gear exchange should be performed within 6 hours of contamination to be most effective. The contaminated squad conducts MOPP gear exchange supported by the unit's supply section. The supply section provides decontaminants and new over-garments. After MOPP gear exchange, Marines will be able to move away from their equipment to a contamination free area, and temporarily reduce MOPP levels.

Site Selection Considerations. The contaminated unit chooses, in coordination with higher headquarters, the site where MOPP gear exchange will be performed. The location should be a site where little preparation is required. Generally, the contaminated unit has the most complete knowledge of local conditions and is best qualified to select the site. When selecting a MOPP gear exchange site, the following should apply:

- Overhead concealment.
- Drainage.
- Be off the main route, but within easy access for vehicles.
- Be large enough area (recommended size is 120 square yards per site) to handle:
 - Vehicle wash down (if performed).
 - MOPP gear exchange for a squad-size element.
- Have a water source. Maximize use of existing facilities, such as car washes, local civilian water sources, etc.

Three Types of MOPP Gear Exchange. The three types of MOPP Gear Exchange procedures that may be performed are:

- Buddy team method. MOPP gear exchange using the buddy team method is best managed with squad-sized elements, using two Marines paired into buddy teams. Two Marines can do this technique, but squad leader supervision is recommended.
- Individual (emergency) method. A single Marine may have to exchange MOPP gear when no one can assist. The contaminated Marine may be alone or his

MOPP Gear Exchange (Continued)

buddy wounded or unable to assist. This method is only used in extreme emergencies since there is a high risk of transferring contamination from the overgarment to skin or undergarments.

- Triple buddy method. Marines equipped with a tanker or aviator mask use this method. A different procedure is required because of the hose attached to the filter canister. A third Marine is needed to hold the filter canister and hose to prevent the transference of contamination to the Marine undergoing the exchange procedure. This method reduces the risk of transferring contamination onto skin or undergarments.

Required Equipment. MOPP gear exchange is a unit (battalion, squadron) responsibility that uses personnel and supplies organic to that unit. The following table lists the equipment required for MOPP gear exchange, by step and type of contamination.

Required Equipment			
Step	All Contamination	Chemical / Biological Contamination	Radiological Contamination
1	<ul style="list-style-type: none"> • Four Long handled brushes • Large pieces of plastic or poncho • Two 30-gallon containers 	<ul style="list-style-type: none"> • One 5-gallon container of STB dry mix • For individual method, M291 Skin Decontaminating Kit 	<ul style="list-style-type: none"> • Hot, soapy water • Rinse water
2	Cutting Tool		
3		Two M291 Skin Decontaminating Kits per person	<ul style="list-style-type: none"> • Three containers (about 3-gallon capacity) • Two sponges • Soapy water • Rinse water • Paper towels or similar drying material
4	Two discard containers, preferably plastic bags		
5	Two discard containers (from step 4)		
6	One set of chemical protective overgarments per Marine (ensure they are the correct size)		

MOPP Gear Exchange (Continued)

Required Equipment (Continued)			
Step	All Contamination	Chemical / Biological Contamination	Radiological Contamination
7	<ul style="list-style-type: none"> One set chemical protective overboots and gloves per Marine (ensure they are the correct size) M9 paper 		
8		M291 Skin Decontamination Kit	<ul style="list-style-type: none"> One container (about 3-gallon capacity) One sponge Hot, soapy water
9	One chemical protective helmet cover		

Buddy MOPP Gear Exchange Procedures. MOPP gear exchange using the Buddy Method is best managed with squad-sized elements. The personnel in each buddy team alternate as they go through step one. At step two, one member proceeds through step eight before alternating to ensure contamination does not spread onto skin or undergarments.

CAUTION: If at any time during the procedure you suspect you have spread contamination onto your skin or undergarments, stop immediately. Decontaminate the suspected area with your skin decontamination kit. After the area is decontaminated, proceed with the MOPP gear exchange.

Step	Action
1	<p>Decon Gear: This step removes gross contamination from individual gear (weapon, helmet, load-bearing equipment, and mask carrier).</p> <ul style="list-style-type: none"> Chemical/Biological Contaminate Procedures: <ul style="list-style-type: none"> Remove and discard the chemical protective helmet cover. Brush or rub STB dry mix (3 parts earth, 2 parts STB) onto individual equipment. Gently shake off any excess. Set aside gear on an uncontaminated surface (plastic, poncho, etc.) Radiological Contaminate Procedures: <ul style="list-style-type: none"> Shake or brush contamination off. Wash the gear with hot, soapy water (if available) Then set aside gear on an uncontaminated surface (plastic, poncho, etc.) to dry.

MOPP Gear Exchange (Continued)

Step	Action
2	<p><u>Prepare For Decon:</u> Personnel may perform this step themselves or with the aid of the buddy. This step allows the Marine to remove his over-garment trousers and over-boots later.</p> <ul style="list-style-type: none"> ○ Remove M9 paper. ○ Unfasten hook and pile fasteners on the trouser legs of the over-garment, and roll a cuff in the trouser legs. Ensure the cuff does not come above the top of the over-boot. ○ Unfasten or cut the fasteners on the GVO/BVO or MULO.
3	<p><u>Decon Mask and Hood:</u> This step removes the gross contamination from the mask and the hood.</p> <ul style="list-style-type: none"> • Chemical/Biological Contaminate Procedures: <ul style="list-style-type: none"> ○ Ensure you do not break the seal on your buddy's mask. ○ Using the M291 Skin Decontamination Kit, decontaminate the exposed parts of your buddy's mask. ○ Start with the eye lens outserts, wiping from the top down. ○ If you are wearing the Saratoga or JSLIST integrated hood, move on the step four. • Radiological Contaminate Procedures: <ul style="list-style-type: none"> ○ Wipe your buddy's mask with a sponge dipped in hot, soapy water. <ul style="list-style-type: none"> - Cool soapy water is not as effective for removing contamination, but can be used if you scrub longer. - If the water supply is limited, use drinking water from your canteen with a wet sponge or cloth.

Step	Action
1	<p><u>Decon Gear:</u> This step removes gross contamination from individual gear (weapon, helmet, load-bearing equipment, and mask carrier).</p> <ul style="list-style-type: none"> • Chemical/Biological Contamination Procedures <ul style="list-style-type: none"> ○ Use M8 detector paper to determine areas of gross contamination ○ Use field expedient absorbents, such as sand, dirt, or rags to remove the gross liquid contamination. ○ Take special care to avoid touching these areas during the over-garment removal. ○ Use your M291 Skin Decontamination Kit to decontaminate your individual gear (helmet, load-bearing equipment, weapon and mask carrier). ○ Set gear aside on uncontaminated surface (plastic, poncho, etc.). • Radiological Contamination Procedures <ul style="list-style-type: none"> ○ Brush or wipe radiological contamination from your individual gear. ○ Wash with hot, soapy water if available. ○ Set gear aside on uncontaminated surface (plastic, poncho, etc.).

MOPP Gear Exchange (Continued)

Step	Action
2	<p><u>Prepare for Decon:</u> This step allows the Marine to remove his over-garment trousers and over-boots later.</p> <ul style="list-style-type: none"> • Remove M9 paper. • Unfasten hook and pile fasteners on the trouser legs and roll a cuff in the trouser legs. Ensure the cuff does not come above the top of the over-boot. • Unfasten or cut the fasteners on the GVOs/BVOs or MULOs.
3	<p><u>Decon Mask and Hood:</u> This step removes the gross contamination from the mask and hood.</p> <ul style="list-style-type: none"> • Chemical/Biological Contamination Procedures <ul style="list-style-type: none"> ○ Using a skin decontamination kit, decontaminate the hood of the integrated Saratoga or JSLIST suit hood and exposed parts of your mask. Start with the mask eye lens outserts, wiping from the top of the hood down. • Radiological Contamination Procedures <ul style="list-style-type: none"> ○ Wipe your mask and hood with a sponge dipped in hot, soapy water. ○ Cool soapy water is not as effective for removing contamination, but can be used if you scrub longer. ○ If water is not available, brush and dust off the radioactive particles. ○ Rinse with a sponge dipped in clear water. ○ Dry with paper towels or rags.
4	<p><u>Remove Over-Garment and Over-Boots:</u> This step limits the spread of agents and helps prevent agents from penetrating through to skin or undergarments.</p> <ul style="list-style-type: none"> • For the Saratoga, <ul style="list-style-type: none"> ○ Untie draw-cord on the hood ○ Untie the draw-cord at the bottom of the jacket • For the JSLIST, <ul style="list-style-type: none"> ○ Unhook the barrel lock ○ Untie the draw-cord, if tied ○ Unfasten the webbing strip snap to release the elastic waistcoat retention cord loop. • Unfasten the hook and pile fastener tapes at the wrist and then refasten loosely. • Feel through the blouse to the suspender fasteners. Unfasten them through the blouse. • Unfasten the hook and pile closure down the front of the jacket and unzip the jacket. • Grasp the back of the hood and gently pull down, then grasp the front of the jacket and pull it back until it is off your shoulders.

MOPP Gear Exchange (Continued)

Step	Action
4	<ul style="list-style-type: none"> Put your arms behind your back and work your arms out of the sleeves. Do not let the outside of the jacket touch your body. When the jacket is off, lay it on the ground with the black side up. Loosen the hook and pile fasteners on the waist. Bend forward at the waist, grasp the suspender fasteners hanging down, and gently toss over your shoulders. Loosen over-boots by alternately stepping on each heel and pulling up on your foot. Grasp the trousers and push them down to the knees. Walk out of the trousers and over-boots simultaneously and step onto the black side of the jacket. You should step onto the jacket wearing his mask undergarments, combat boots and gloves.
5	<p><u>Remove Gloves:</u> Before removing your gloves, decontaminate with the skin decontamination kit.</p> <ul style="list-style-type: none"> Your gloves. Around the edges of the packages containing the replacement over-garments, over-boots, and gloves. Open the new packages. Once you have opened the replacement gear packages, remove your old gloves. Hold the fingertips of the glove and partially slide the hand out. When fingers of both hands are free, <ul style="list-style-type: none"> Hold arms away from body Let the gloves drop off.
6	<p><u>Put On Overgarment:</u> Carefully reach into the package and remove the over-garment. Then begin redressing procedures:</p> <ul style="list-style-type: none"> Put on trousers and jacket. Fasten the over-garment, but leave trouser legs open (until you put on new over-boots).
7	<p><u>Put On Overboots and Gloves:</u> Carefully reach into the package. Remove the:</p> <ul style="list-style-type: none"> Over-boots one at a time, without touching the outside of the package. Put them on. Gloves from their package without touching the outside. Put them on. Fasten your trouser legs.
8	<p><u>Secure Hood:</u> Decontaminate your rubber gloves with a skin decontaminating kit. Pull the hood of the Saratoga/JSLIST over your head and tie the draw-cord or fasten the barrel lock and tighten the draw-cord.</p>

MOPP Gear Exchange (Continued)

9	Secure Gear: Put individual gear back on. Put a new chemical protective helmet cover and move to the assembly area.
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Site Close Out Procedures: Although the MOPP gear exchange is done rapidly with little site preparation, the area will be contaminated when the exchange is completed and could be a hazard to friendly forces reoccupying the area. Therefore,

- All contaminated waste will be placed into a hole and be covered with earth. Mark the area using the standard CBRN contamination markers.
- At a minimum, place the waste in double trash bags. Seal the bags with tape or other material and mark the area.

Unmasking Procedures

In a chemical environment, MOPP4 will eventually take its toll on Marines operating in or near the contaminated area. Sooner or later you will have to remove your mask. Although you may suspect the area of being contamination free, unmasking procedures will have to be utilized to ensure the safety of the unit. Who do you think the Commanding Officer will be looking for to do this selective unmasking? It is going to be that hard-charging CBRN specialist. You will benefit from this instruction by being able to conduct that unmasking for your unit when the situation does arise.

The purpose of unmasking procedures is to alleviate the Marine's encapsulation as quickly as possible. These procedures will be conducted after all methods of agent detection have failed to indicate any agent. The following two unmasking procedures will determine if it is safe to unmask. Unmasking procedures will be initiated after notification to do so by higher headquarters or the immediate commander.

Unmasking with a Detector Kit: Unmasking with a M256A1 kit takes approximately 15 minutes.

- Use the M256A1 detector kit at different points in the perimeter to determine the presence of vapor and liquid chemical agents.

Unmasking with a Detector Kit (Continued)

- If no agent is detected, the senior Marine present will:
 - o Designate two-three Marines
 - o Brief them on the procedures to be followed
 - o Have them sit in a shaded area out of direct sunlight
 - o Ensure they are unarmed
 - o Have the Marines unmask for 5 minutes, and then don the FPM.
 - o Observe them for ten minutes.

Unmasking Procedures (Continued)

CAUTION: Always have first-aid treatment immediately available in case of need.

- If no symptoms appear, notify higher headquarters of test results. Then request permission to unmask.
- Once permission is granted,
 - Give the all clear signal.
 - Have the remainder of the unit unmask in accordance with unit standard operating procedure (SOP).
 - Continue to watch for symptoms.

Unmasking without a Detector Kit. Unmasking without a detector kit takes approximately thirty minutes.

Use M8/M9 paper to check for possible liquid contamination.

- The senior Marine will:
 - Designate two - three Marines
 - Brief them on procedures to be followed
 - Have them move to a shaded area
 - Ensure they are unarmed
- The selected Marines:
 - Take a deep breath.
 - Keep their eyes open.
 - Break the seal of their masks for fifteen seconds.
 - Then reseal and clear their masks.
 - Wait for ten minutes.

CAUTION: Have first-aid treatment available.

- Observe the selected Marines for symptoms.
- If no symptoms appear,
 - The selected Marines break the seal of their mask, and with eyes open, take two or three normal breaths, then reseal and clear their mask.
 - Observe the Marines for symptoms of chemical agent exposure for 10 minutes.
 - If no symptoms appear, have the Marines unmask for 5 minutes and then re-mask. Wait an additional 10 minutes and observe for symptoms.
 - If no symptoms appear after ten minutes, notify higher headquarters of test results, then request permission to unmask.
 - Unmask remainder of unit in accordance with unit SOP.
 - Continue to observe the selected Marines for delayed symptoms.
- If either unmasking procedure indicates an agent is present, the senior Marine must decide to do one of the following:
 - Move to a new area and re-test
- If movement cannot be accomplished, continue mission and retest after an hour has passed.
- Use collective protection if available.

CBRN Reports

With the ever-increasing threat of attack by chemical and biological agents, CBRN specialists must be prepared to quickly compile and disseminate data concerning such an attack. To aid in this, the CBRN Warning and Reporting System has been developed. Quick action on the battlefield will save lives; therefore you must fully understand the CBRN Warning and Reporting System.

CBRN-1 Chemical and Biological Reports.

Purpose. The CBRN-1 Report, the most widely used report, is referred to as the Observer's Report and provides basic data on CBRN attacks.

Responsibilities. All units prepare and forward CBRN-1 reports. Once the CBRN-1 report is prepared, it is transmitted to higher headquarters. Battalion and higher headquarter elements decide which CBRN-1 reports to forward up the chain of command.

Individuals identified by unit SOP

- Submit observations to the unit CBRN defense team at company/battery/squadron etc., level
- Determine the:
 - Date-time group of the attack.
 - Means of delivery.
 - Type of burst (air or ground).
 - Type of agent, if possible.
- May report the data in any format (SPOT, SALUTE, SITREP)

Once the individual report reaches the unit CBRN team, the CBRN defense team translates the data received into the NBC-1 format and consolidates it into an CBRN-1 Report

Message Precedence: The initial CBRN-1 Report will be transmitted using a FLASH precedence. All subsequent reports are transmitted with an IMMEDIATE precedence.

Originator: Observing units' CBRN defense teams must prepare this report quickly and accurately. All CBRN-1 Reports must include the items listed below:

- **Bravo:** Position of observer, using grid coordinates or place.
- **Delta:** Date-time group for the **day and time the attack started**. Time zone used must be designated.
- **Hotel:**
 - Type of agent.
 - Type of burst.
 - Specifying air or surface.
 - Stating whether ground, airburst, or spray attack for chemical.
 - **If type of agent is known, then transmit**
 - P for persistent.

CBRN Reports (Continued)

- NP for non-persistent.
- o Either:
 - Charlie: Direction of the attack from the observer. This direction is measured clockwise from grid or magnetic north (state which) and given in degrees or mils (state which). For example, 120 deg (grid) or 124 deg (mag)
 - Foxtrot: Location of area attacked using grid coordinates or the place, stating whether the location is actual or estimated. For example, AY345634 ACT

Note: When submitting the CBRN-1 Report, either line item Charlie or Foxtrot is submitted, **not both**.

- Use other line items to submit known additional information, such as GOLF (means of delivery).
- If a unit has the capability, submit local weather information prescribed in lines YANKEE and ZULU ALFA.

Example of CBRN 1 Chem Report:

B. DF 234564
C. 120 DEG GRID
D. 22 0615Z MAR 00
G. ARTILLERY
H. VX (P), AIR 10-2

Summary

With proper protective clothing Marines can survive in a chemically contaminated environment and operate and continue their mission. The benefit of this instruction is that you will be better able to prepare your unit's CBRN defense readiness to reduce casualties and maintain combat effectiveness.

References

Reference Number or Author	Reference Title
MCRP 3-37.2A	Multi-Service Tactics, Techniques, and Procedures for CBRN Contamination Avoidance
MCRP 3-37.2B	Nuclear Contamination Avoidance
MCWP 3-37.3	Multi-Service Tactics, Techniques, and Procedures for CBRN Contamination

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